

Infection by intestinal parasites in disabled patients and their guardians

Infecção por parasitos intestinais em pacientes com necessidades especiais e seus tutores

Eluane de Lucas da S. Martins¹, Adriano Pereira², Vera Lucia Pagliusi Castilho³, Elenice Messias do Nascimento Gonçalves⁴, Maria Anete Lallo^{5*}

¹ *Doutoranda em Medicina Veterinária pela Universidade Paulista – UNIP, Enfermeira Supervisora de estágio no Curso de Graduação de Enfermagem da Universidade Paulista – UNIP;* ² *Biomédico pela Academia Paulista Anchieta – APA, Doutor em Patologia Ambiental e Experimental pela Universidade Paulista – UNIP, Professor de Bioterismo do Centro Universitário São Camilo, São Paulo;* ³ *Médica pela Faculdade de Medicina de Marília de São Paulo, Doutora pela Faculdade de Medicina da Universidade de São Paulo – USP, Diretora do Laboratório Clínico do Instituto de Infectologia Emílio Ribas;* ⁴ *Biomédica pela Universidade de Mogi das Cruzes, São Paulo, Doutora em Ciências pela Faculdade de Medicina da USP, Professora Assistente do Centro Universitário São Camilo;* ⁵ *Médica Veterinária pela Universidade Estadual de Londrina, Doutora em Epidemiologia Experimental Aplicada às Zoonoses pela USP, Professora Titular e Coordenadora do Programa de Pós-graduação em patologia Ambiental e Experimental da UNIP*

Abstract

Introduction: intestinal parasitic infections are common major problem closely related to poverty, inadequate sanitation, insufficient health care and overcrowding. They cause significant morbidity among institutionalized patients, however, there are few studies that analyze the frequency of intestinal parasites in disabled patients that are not institutionalized. **Objective:** the aim of the present study was to determine the prevalence of intestinal parasitic infection in disabled patients and their guardians. **Methodology:** a total of 336 fecal samples were collected from 53 disabled patients and history of diarrhea during the study period and 31 guardians, parents and professional staff of Institution. Parasite research was carried out using zinc sulphate centrifugal-flotation technique, Lutz/Hoffman Pons and Janer method, Rugai method and Gram-Chromotrope, Leishman, Kinyoun, Kato-Katz and Trichrome stains were used. **Results:** we found 15.5% of positive sample for enteroparasites in all analyzed individuals (13/84), with 11.3% (6/53) of prevalence in disabled patients and 22.5% (7/31) for guardians, with significant difference. There was no difference between gender, but there was a higher number of positives in patients between 6 and 11 years of age. Monoparasitism and the presence of protozoa, especially *Blastocystis hominis*, were the most prevalent conditions. **Conclusions:** despite the aforementioned intrinsic susceptibility of patients with special needs, the prevalence of intestinal parasites was low. In guardians, the prevalence was higher, suggesting extreme attention to the care process, which may have prevented the transmission to their disabled patients contact. **Keywords:** Guardians. Prevalence of enteroparasites. Neuropsychomotor deficiency. Patients.

Resumo

Introdução: as infecções parasitárias intestinais são um problema comum, intimamente relacionado à pobreza, saneamento inadequado, assistência médica insuficiente e superpopulação. Essas infecções causam morbidade significativa em pacientes institucionalizados, no entanto, existem poucos estudos que analisam a frequência de parasitas intestinais em pacientes com necessidades especiais não institucionalizados. **Objetivo:** o presente estudo teve como propósito determinar a prevalência de infecção parasitária intestinal em pacientes com necessidades especiais e seus responsáveis/tutores. **Metodologia:** foram coletadas 336 amostras fecais de 53 pacientes com necessidades especiais e histórico de diarreia durante o período do estudo e 31 responsáveis/tutores, pais e equipe profissional relacionada. As técnicas de centrífugo-flutuação em sulfato de zinco, método Lutz/Hoffman Pons e Janer, método Rugai e Gram-Cromotrópico, Leishman, Kinyoun, Kato-Katz e Tricrômica foram utilizadas para a pesquisa de helmintos e protozoários. **Resultados:** foi encontrado 15,5% (13/84) de prevalência de enteroparasitos em todos os indivíduos analisados, sendo 11,3% (6/53) de prevalência em pacientes com necessidades especiais e 22,5% (7/31) de responsáveis/tutores, com diferença significativa. Não houve diferença entre os sexos, mas encontrou-se maior número de positivos em pacientes com 6 a 11 anos de idade. O monoparasitismo e a presença de protozoários, especialmente *Blastocystis hominis*, foram as condições mais prevalentes. **Conclusões:** apesar da suscetibilidade intrínseca dos pacientes com necessidades especiais, a prevalência de parasitas intestinais foi baixa. Nos responsáveis, a prevalência foi maior, sugerindo extrema atenção ao processo de cuidar, o que pode ter evitado a transmissão para os seus pacientes com necessidades especiais contactantes. **Palavras-chave:** Deficiência neuropsicomotora. Pacientes. Prevalência de enteroparasitas. Tutores.

Correspondente/Corresponding: *Maria Anete Lallo – End: Av. José Maria Whitaker 290, Mirandópolis, São Paulo, SP, CEP: 05622-001. - Tel: (11) 9 9986-9607 – E-mail: anetelallo@hotmail.com / maria.lallo@docente.unip.br

INTRODUCTION

Intestinal parasitic infections can have a significant impact on people's quality of life and most of the time it is

related not only to environmental factors but also social, economic and cultural conditions¹. In developing countries located in tropical areas, lack of access to health services, malnutrition and lack of sanitation are determining factors for the occurrence of parasitic diseases^{2,3}.

Disorders of motor and/or cognitive development, including Hypoxic-ischaemic Encephalopathy, Global Developmental Delay, Down Syndrome among others, can reduce the functional capacity of individuals, affecting the neuromotor function of the digestive system, which lead to poor digestion and malabsorption⁴. In addition, they may compromise the ability to learn and/or adopt hygienic measures, which may predispose to enteric parasite infection^{5,6}. Thus, it is emphasized that general sanitary conditions related to the treated water network, sewage collection, sanitary inspection of food, soil, water and food contamination, household hygiene, also work in this group, contributing to the occurrence of intestinal parasites^{5,6}.

Care institutions for patients with motor and cognitive impairments may present different sources of infection for patients that include the hygienic habits of caregivers, cooks and health professionals, the poor sanitary conditions of the facilities, the quality of the water and the foods offered. Thus, such centers may be epidemiologically linked, with higher prevalence of parasitic infections, with levels of 20.4% of patients with mental disorders were positive for intestinal parasites⁷. In addition, overall infections rate of intestinal parasite was 26.2% in inhabitants of rehabilitation centers⁶. Thus, the objective of this study was to evaluate the prevalence of intestinal parasites in non-institutionalized disabled patients and their guardians.

METHODOLOGY

The research was approved by the Ethics and Research Committees of the Paulista University (protocol number 1211/16) and Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo (protocol number 501.470)

This descriptive – cross sectional study with total population sampling was carried out on 84 individuals, of which 53 was disabled patients and a history of diarrhea, and 31 guardians involved in caring activities. All sampled individuals were related to a non-governmental institution to provide health care for individuals with cognitive and physical deficiency. The purpose of the institution besides therapeutic is to promote social assistance to patients with neuropsychomotor disabilities, belonging to families in situation of social vulnerability, free of charge and predetermined time.

Four stool samples were collected per subject on alternate days and a total of 336 samples were analyzed. Each fecal sample was collected in a universal sterile container with or without preservative solution and maintained at 4°C, until laboratory analysis on the next 48 hours. Flasks

were labeled with the name of the patient or tutor and date on collection. The Hoffman-Pons-Janer⁸, centrifugal flotation in zinc sulfate solution⁹ and Rugai¹⁰ methods were used to prepare samples. In addition, Gram-Chromotrope¹¹, Leishman¹², Kinyoun¹³, Kato-Katz¹⁴ e trichrome¹⁵ staining techniques were used for protozoan research. Two slides were examined for each stool sample and method to detect parasites using optical microscopy (Nikon, Japan) with magnifications of 100x, 400x and 1000x.

Statistical analysis was performed using SPSS software. The data were evaluated by Chi-Square test or, when appropriate, Fisher's exact test. The level of significance adopted for statistical inference was of 5%.

RESULTS

A total of 336 stool specimens from 84 individuals were analyzed, 53 from patients and 31 from tutors, including staff and relatives. Disabled patients (n = 53) ranged in age from 2 to 34 years and were subdivided into 4 groups: 5 (9%) patients with ages ranging from 2 to 5 years; 22 (42%) patients aged 6 to 11 years, 11 (21%) patients aged 12 to 18 years and 15 (28%) patients aged 19 years or older. Of the patients that constituted this experimental group, 25 (47%) were female and 28 (53%) male. The guardians (n = 31) who constituted the experimental group had ages ranging from 18 to 70 years of age, 29 (93.5%) were female and 2 (6.5%) were male.

The overall prevalence of positive samples for enteroparasites was 15.5% (13/84) (Table 1). When analyzing the groups separately, it was observed that among the patients the positivity was 11.3% (6/53) and for guardians the frequency of parasites was 22.5% (7/31) (Table 1). There was a higher frequency of monoparasitism 69.2% (9/13) than polyparasitism 30.7% (4/13). The intestinal parasites were: *Blastocystis hominis* (11/13, 84.6%), *Entamoeba coli* (2/13, 15.4%), *Endolimax nana* (2/13, 15.5%), *Cryptosporidium* sp (1/13, 13.8%), *Schistosoma mansoni* (1/13, 7.8%), and *Trichostrongylus* spp (1/13, 7.8%). Thus, a higher prevalence of protozoa (4/6, 66.6%) was observed when compared to helminths (2/6, 33.3%) (Table 1).

Table 1 – Prevalence of intestinal parasites according to the group evaluated.

Groups	Number of individuals analyzed	Number of positives (%)	P value*
Disabled patients	53	6 (11.3)	2,456
Guardians	31	7 (22.5)	
Total	84	13 (15.5)	

*Chi-square test

Source: Own authorship

Factors related to the management of these disabled patients and that could predispose to parasitic diseases have been described (Table 2). In relation to the tutors, the factors that could predispose the infection were the habit of sucking fingers, maintaining long nails, and a tutor assisted the wife with a colostomy bag.

Table 2 – Disable Patients with their respective syndrome, presence of predisposing factors and diagnosed intestinal parasites.

Patient	Syndrome	Diagnosed parasite	Use of diapers	Unfiltered water consumption	Contact with pets	Absence of treatment with antiparasitics
1	Hipoxic-ischaemic Encephalopathy	<i>Blastocystis hominis</i>	X	X	X	X
2	Hipoxic-ischaemic Encephalopathy	<i>Blastocystis hominis</i>	X	X	X	X
3	Myelomeningocele	<i>Endolimax nana</i>	X	X	X	X
4	Hipoxic-ischaemic Encephalopathy	<i>Cryptosporidium spp.</i>	X	X	X	X
5	Hipoxic-ischaemic Encephalopathy	<i>Blastocystis hominis</i>	X	X	X	X
6	Hipoxic-ischaemic Encephalopathy	<i>Blastocystis hominis</i>	X	X	X	X

Source: Own authorship

Other aspects related to the susceptibility to enteroparasites were analyzed, such as age and gender, and for these aspects also no significant differences were observed. In the group of disabled patients, considering the gender, the prevalence was 12.0% (3/25) for the female gender and 10.7% (3/28) for the male. In addition, all positive cases were concentrated in the age range of 6 to 11 years, with prevalence in this range of 11.3% (6/53) (Table 2). In guardians, the positives represented 17.2% (5/29) for the female gender and 100% (2/2) for the male. All subjects were adults and there was no statistical difference in the age group (Table 3).

Table 3 - Frequency of positives per group researched according to gender and age group.

Groups	Number of individuals analyzed (%)	Number of positives for parasites (%)	P value *
Disabled patients (n=53) gender			
Female	25 (47.0)	3 (12.0)	0.322
Male	28 (53.0)	3 (10.7)	
Age of disabled patients			
2 to 5 years	05 (9.0)	6 (27.3)	11.365
6 to 11 years	22 (42.0)		
12 to 18 years	11 (21.0)		
Up to 19 years	15 (28.0)		
Guardians (n=31) gender			
Female	29 (93.5)	5 (17.2)	5,526
Male	2 (6.5)	2 (100)	

*Chi-square or Fisher's exact test

Source: Own authorship

DISCUSSION

In the present study, the prevalence of intestinal parasites observed in disabled patients was 11.3% with the only meeting of protozoa. In contrast, in Benin-Nigeria, intestinal helminths were investigated in children with chronic neurological diseases treated at the outpatient clinic of the University Hospital and the prevalence was high, 31%¹⁶. This study points out two risk factors present in the population evaluated – low socioeconomic status of the population and poor hygienic-sanitary care related to educational failures. Thus, these results show that the tutors of the patients, although with low level of education and socioeconomic status, have hygienic-sanitary knowledge that is applied in the daily context to prevent infections by parasites, justifying the low prevalence. On the other hand, in southwestern Nigeria, children with chronic neurological diseases had an 8,5% prevalence for intestinal helminths, a low occurrence related to the best sanitary conditions of the region¹⁷.

A survey carried out in a socio-educational center in Brazil showed that 42.4% of the analyzed individuals, including minors and employees, were positive for enteroparasitosis, being this prevalence much higher than the one identified in our study¹⁸. In children living in a welfare institution for minors in the city of Niterói, RJ and its employees, 70 and 44% of positive results were obtained for intestinal parasitic diseases, respectively, in children and staff¹⁹. Therefore, a great difference between the results observed in the present study and those found by other authors was found, investigating populations of children of similar age, considering that the positive patients were

children. It should be emphasized that the presence of neurological diseases with impairment of motor and cognitive abilities was the main difference between this study and the others, generating in the tutors and professionals of the Institution a great concern with hygiene and sanity, probably a preponderant factor to determine this low prevalence of parasitoses.

Regarding the guardians, it was possible to detect 28.5% of positive results, which allowed a lower rate of enteroparasitosis to be observed when compared to the study carried out with employees of a charity, which indicates that 44% of collaborators were positive for enteroparasitosis¹⁸. It was demonstrated that 38.6% of the positive among the employees of eight daycare centers¹⁹. Another study showed that the prevalence was 16.7% in the employees analyzed in a daycare center²⁰, a lower frequency among employees compared to our study.

Children aged six months to five years presented 52% polyparasitism, with up to five different parasites and a predominance of the association of *Ascaris lumbricoides* with other parasites such as *Ancylostoma duodenale*, *Entamoeba coli*, *Endolimax nana* and *Dipylidium caninum*. The authors pointed out a relation of the data obtained to the socioeconomic conditions and poor hygiene habits²¹. Unlike the present study in which there was a predominance of monoparasitism and prevalence of *Blastocystis hominis* protozoa, followed by the presence of *Cryptosporidium* and *Endolimax nana*.

Blastocystis hominis are anaerobic intestinal protozoa with fecal-oral spread. They have high rates of occurrence in faecal samples of immunocompetent and immunosuppressed individuals in developing countries²². Although not

identified as an important agent of diarrhea, as was the most identified protozoan, it is likely that its presence is related to the symptoms presented by the disabled patients.

Cryptosporidium is a protozoan of cosmopolitan distribution, appearing among the main enteropathogens causing diarrhea, including in patients with AIDS, in transplanted patients, those submitted to chemotherapy or in those with immunosuppressive infectious diseases¹⁸. In the present study, only one case of cryptosporidiosis was detected in a 7-year-old patient, presenting symptomatology that varied between diarrhea and constipation. Therefore, the prevalence of this enteropathogen was low, but because it is an opportunistic and zoonotic agent, it is emphasized that the child was treated because it represents a potential source of parasite infection.

In the present study there was no significant difference between genders. On the contrary, in Nigeria, a higher positivity was observed in boys with chronic neurological disease, and the authors related this occurrence to the more adventurous behavior⁸. As in our study all the individuals presented severe motor deficiency, with paralysis/paraplegia, the behavioral factor had no influence.

CONCLUSION

We can conclude that in the study population the prevalence of enteroparasites was 15.5%. When analyzing the groups separately, it was observed that among the disabled patients the positivity was 11.3% and for the guardians was 22.5%. Monoparasitism and protozoan infection were more prevalent. No age or sexual predisposition was observed.

REFERENCES

1. QUIHUA, L. et al. Role of the employment status and education of mothers in the prevalence of intestinal parasitic infections in Mexican rural schoolchildren. *BMC Public Health*, Genebra, v. 6, p. 1-8, 2006.
2. ANDRADE, E.C. et al. Parasitoses intestinais: Uma revisão sobre seus aspectos sociais, epidemiológicos, clínicos e terapêuticos. *Revista APS – Atenção Primária à Saúde*, Juiz de Fora, v. 13, n. 2, p. 231-240, 2010.
3. SILVEIRA, M. M. W. et al. Enteroparasitoses em crianças atendidas pelas Unidades Básicas de Saúde do Município de Jundiá – SP. *Revista Científica de America Latina y el Caribe, España y Portugal*, Cidade do México, v. 28, n. 1, p. 13-23, 2017.
4. BRAGA, W.S.; MENDES, J.F.R. Avaliação do estado nutricional, terapia nutricional e queixas gastrointestinais em crianças com paralisia cerebral: uma revisão da literatura. *Comunicações em Ciência Saúde*, Brasília, v. 24, n. 1, p. 27-38, 2013.
5. GATTI, S. et al. Intestinal parasitic infections in an institution for the mentally retarded. *Ann. Trop. Med. Parasitol.*, Londres, v. 9, n. 5, p. 453-460, 2000.
6. SHARIF, M. et al. Intestinal parasitic infections among intellectual disability children in rehabilitation centers of northern Iran. *Res. Dev. Disabil.*, Cidade do México, v.31, p. 924-928, 2010.

7. TAPPEH, K.H. et al. Prevalence of intestinal parasitic infections among mentally disabled children and adults of Urmia, Iran. *J. Parasitol.*, Irã, v. 5, n. 2, p. 60-64, 2010.
8. HOFFAMAN, W.A.; PONS J.A.; JANER, J.L. The sedimentation concentration method in *Schistosomiasis mansoni*. *J. Trop. Med. Public Health*, São Paulo, v. 9, p. 283-298, 1934.
9. PEREIRA, D.S.; FERREIRA, C.S. Método de Faust et al: rendimento de colheita por alça metálica. *Rev. Inst. Med. Trop. São Paulo*, São Paulo, v. 33, n. 2, p. 153-158, 1991.
10. RUGAI, E.; MATTOS, T.; BRISOLA, A.P. Nova técnica para isolar larvas de nematódeos das fezes – modificação do método de Baermann. *Rev. Instit. Adolfo Lutz*, São Paulo, v. 14, n. 1, 1954.
11. MOURA, H. et al. Gram-Cromothrope: a new technique that enhance detection microsporidial spores in clinical samples. *J. Eukaryotic Microbiol.*, Cidade do México, v. 43, n. 5, p. 94S-95S, 1996.
12. ROSENFELD, G. Corante pancrônico para hematologia e citologia clínica. Nova combinação dos componentes do May Grünwald e do Giensa num só corante de emprego rápido. *Mem. Instit. Butantan*, São Paulo, v. 20, p. 329-334, 1947.
13. KINYOUN, J.J. A note uhlenhuths method for sputum examination, for tubercle bacilli. *Am. Public Health Association*, Jacksonville, v. 5, n. 9, p. 867-870, 1914.
14. CHAVES, A. et al. Estudo comparativo dos métodos coprológicos de Lutz, Kato-katz e Faust modificado. *Rev. Saúde Pública*, São Paulo, v. 13, n. 4, 1979.
15. AMATO, J.G.P.; AMATO, V.S.; AMATO NETO, V. Aplicação de método de coloração tricrômica, em fezes diarreicas de infectados pelo HIV, para pesquisa de microsporídios. *Revista da Sociedade Brasileira de Medicina Tropical*, São Paulo, v. 32, n. 3, p. 277-283, 1999.
16. NWANERI, D.U. et al. Intestinal helminthiasis in children with chronic neurological disorders in Benin City, Nigeria: intensity and behavioral risk factors. *World J. Pediatr.* Hangzhou, v. 9, n. 2, p.152-157, 2013.
17. UZODIMMA, C.E. et al. Prevalence of intestinal helminthiasis among children with chronic neurologic disorders in Nigeria Teaching Hospital (UNTH) Ituku – Ozaala. *J. Neurological Disorders*, Kiel, v. 4, n.258. DOI: 10.4172/2329-6895.1000248.
18. FIGUEIREDO, M.I.O.; QUEROL, E. Levantamento das parasitoses intestinais em crianças de 4 a 12 anos e funcionários que manipulam o alimento de um Centro sócio-educativo de Uruguaiana, RS, Brasil. *Biodiversidade Pampeana*, Porto Alegre, v. 9, n. 1, 2012.
19. LEITE, R.O.; TOMA, H.K.; ADAMI, Y.L. Diagnóstico parasitológico e molecular de enteroparasitoses entre crianças residentes e funcionários de uma instituição beneficente para menores no município de Niterói-RJ-Brasil. *Revista de Patologia Tropical*, Goiania, v. 43, n. 4, p. 446-448, 2014.
20. KOMAGOME, S.H. et al. Fatores de risco para infecção parasitária intestinal em crianças e funcionários de creche. *Ciências Cuidado e Saúde*, Maringá, v. 6, n. 2, p. 442-447, 2007.
21. COSTA, T.D. et al. Análise de enteroparasitoses em crianças em idade pré-escolar em município de Santa Catarina, Brasil. *Revista Prevenção de Infecção e Saúde*, Teresina, v. 1, n. 2, p.1-9, 2015.
22. NETO, V.M. et al. Elevada porcentagem de blastocistose em escolares de São Paulo, SP. *Revista da Sociedade da Brasileira Medicina Tropical*, São Paulo, v. 37, n. 4, p. 354-356, 1999.

Submetido em: 10/07/2020

Aceito em: 16/11/2020